

REMARKS

Claims 1 - 21 are pending in the present application, of which claims 3 and 6 - 21 have been withdrawn from consideration. By this Amendment, Applicants respectfully submit that no new matter has been added. It is believed that this Amendment is fully responsive to the Office Action dated **January 2, 2003**.

Examiner Interview:

The courtesy extended by Examiner Greene and Supervisor Examiner Flynn during the April 1, 2003 interview is gratefully acknowledged. The substance of discussions during the interview are incorporated into the following remarks.

IN THE DRAWINGS:

The drawings stand objected to under 37 CFR 1.83(a) due to the Examiner's assertions that: the tapered stem with the first and second insulating layer must be shown in the figures; the drawings fails to disclose the combination of claims 1 and 2, it is unclear which drawings should be referenced when the examining the elected claims.

It is respectfully submitted that a preferred embodiment of the claimed final structure is clearly illustrated in Fig. 2C of the present application. More specifically, Fig. 2C clearly includes a first insulating layer D, a second insulating layer TiO 17a and an upper conductive layer 17b which

is formed on the second insulating layer 17a. Moreover, Fig. 2C clearly shows that the stem of the mushroom gate structure rides on the first insulating film D near the opposite ends of the stem along the current direction.

In addition, it is respectfully submitted that during the April 1, 2003 Examiner interview, it was agreed that the structure illustrated in Fig. 2C was sufficient to obviate the Examiner's above objections to the drawings.

35 U.S.C. §112, Second Paragraph, Rejection:

Claims 1, 2, 4 and 5 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

This rejection is respectfully traversed.

Fig. 2C clearly includes a first insulating layer D, a second insulating layer TiO 17a and an upper conductive layer 17b which is formed on the second insulating layer 17a. Moreover, Fig. 2C clearly shows that the stem of the mushroom gate structure rides on the first insulating film D near the opposite ends of the stem along the current direction.

Again, it is respectfully submitted that during the April 1, 2003 Examiner interview, it was agreed that the structure illustrated in Fig. 2C was sufficient to obviate the Examiner's rejection under 35 U.S.C. §112, second paragraph. Accordingly, withdrawal of this rejection is respectfully solicited.

As to the Merits:

As to the merits of this case, the Examiner sets forth the following rejections:

- 1) claims 1 and 2 stand rejected under 35 U.S.C. §102(b) as being anticipated by Sasaki et al. (U.S. Patent No. 6,180,528); and
- 2) claim 4 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Sasaki in view of Tokue (Japanese Patent Publication No. 402142143 A).

These rejections are respectfully traversed.

Claim 1, as amended, now calls for *a mushroom gate electrode structure ... the head having a size expanded stepwise along the current direction at a level above an upper surface of said first insulating film, and the stem contacting said semiconductor substrate in the gate electrode opening and riding on said upper surface of said first insulating film near at a position of at least one of opposite ends of the stem along the current direction.*

It is respectfully submitted that Sasaki et al. fail to disclose the features of claim 1, as amended, concerning *the head having a size expanded stepwise along the current direction at a level above an upper surface of said first insulating film, and the stem contacting said semiconductor substrate in the gate electrode opening and riding on said upper surface of said first insulating film near at a position of at least one of opposite ends of the stem along the current direction.*

That is, the stem of the gate electrode 8, illustrated in Fig. 3E of Sasaki, clearly does not ride on the upper surface of the first insulating film, as now called for in claim 1. Instead, the stem of the gate electrode 8 rides on the substrate 1.

In addition, it is respectfully submitted that the head of the gate electrode 8, illustrated in Fig. 3E of Sasaki, clearly is not at a level above an upper surface of the insulating film 13, as now called for in claim 1.

Moreover, it is respectfully submitted that during the April 1, 2003 Examiner interview, it was agreed that the amendments to claim 1 clearly distinguish over the applied prior art reference of Sasaki.

In view of the aforementioned amendments and accompanying remarks, the claims, as amended, are in condition for allowance, which action, at an early date, is requested.

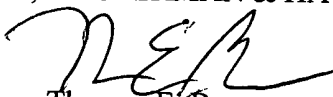
If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicant's undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "Version with markings to show changes made."

In the event that this paper is not timely filed, Applicant respectfully petitions for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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PATENT TRADEMARK OFFICE

Enclosures: Version with markings to show changes made

VERSION WITH MARKINGS TO SHOW CHANGES MADE 10/084,924

IN THE CLAIMS:

Claim 1 has been amended to read as follows:

1. (Amended) A semiconductor device comprising:

a semiconductor substrate having current input/output regions via which current flows;

a first insulating film formed on said semiconductor substrate and having a gate electrode opening; and

a mushroom gate electrode structure formed on said semiconductor substrate via the gate electrode opening, said mushroom gate electrode structure having a stem and a head formed on the stem, the stem having a limited size on said semiconductor substrate along a current direction and having a forward taper shape upwardly and monotonically increasing the size along the current direction, the head having a size expanded stepwise along the current direction at a level above an upper surface of said first insulating film, and the stem contacting said semiconductor substrate in the gate electrode opening and riding on said upper surface of said first insulating film near at a position of at least one of opposite ends of the stem along the current direction.